Effect of Heuristic Teaching on Scores of Elementary schools' Students

1Keyvan Tiari, 2Mahdi Ghaemi, 3Abdolhossin Naghezade-Anhar, 4Hadi Asadi

1Department of Education, Payam Noor University, Tehran, Iran.
2Department of Social Sciences, Payam Noor University, Tehran, Iran, Iran.
3Department of Education, Payam Noor University, Tehran, Iran.
4Department of Education, University azad islamic semnan.

INTRODUCTION

Heuristic learning is processing that students should identify considered problems, possible solutions should be considered and test solutions based on test, conclude suitable, use these conclusions in new situations, and finally use it as rules [7].

Heuristic learning points to method teaching which students do not need to teachers or without leading of teacher can achieve their objectives. Specific features f heuristic learning includes amount of leading of teacher to students and leading includes as following:
1. Teacher can explain principle and solutions.
2. Teacher can do not lead teacher by given principle and solutions and this type of learning call without leading
3. Teacher can only use principle of heuristic learning for students, however, do not access solutions for students.

The word "heuristic" is derived from the Greek word heurisko" meaning "I find out" and the "Heuristic Method" is one in which the pupils are left to find out things for themselves. Children are placed, as far as possible, in the position of discoverers and instead of being told the facts; they are led to find out things for themselves.

Through this method, the pupils are made to learn. The Heuristic method was, for the first time, coined by Dr. H. E. Armstrong (1888-1928), Professor of Chemistry at City and Guild Institute Kensington. This method of teaching is of a very recent origin. First it was used in Science and its success led it to be adopted in the teaching of all subjects in the School Curriculum.

The aim of this method is to develop the scientific attitude and spirit in pupils. The spirit of enquiry prompts the pupils to learn. This method insists on truth, whose foundation is based on reason and personal experiences.

In fact there is no spoon-feeding or more acceptances of facts, which are given by the teacher. An eminent educationist has pointed out that the object of the heuristic method is "to make pupils more exact, more truthful, observant and thoughtful to lay this solid foundation for future self-education and to encourage this growth of spirit of enquiry and research."

All the children in a class may be set to work simultaneously at this same problem in adopting the heuristic method. Each child with all attention strives to find out something for himself. Heuristic method aims at the pupils' own observations to satisfy as many questions as possible to be raised in the teaching-learning situation.
Much is demanded of the teacher in the heuristic method of teaching. He should be a great reader of books in order to obtain varied information. The teacher should possess much curiosity, observation, interest and spirit of scientific investigation, because these are the qualities he wishes to develop in pupils. The teacher should realize the responsibility of fostering in this pupils good habits of reading and collecting various information from books.

In the heuristic method, the teacher is a guide and also a working partner. As a friend of pupils, this teacher should proceed on the way to discover facts. He is to see that this class room is pervaded by an atmosphere of freedom and that the work provided to the children encourages self-development, spontaneity and self-expression.

This method is used not only in teaching scientific subjects like Mathematics, Physics, Chemistry and Nature Study, but in all subjects of the curriculum. A close study of this method reveals that it is in reality this heuristic attitude which should characterize teaching of all subjects. It is opposed to dogmatic techniques of teaching, where pupils are passive learners. This may be applied to inductive as well as deductive lessons and thus heuristic method is problem-solving.

According to its author Prof. Armstrong, "Heuristic methods of teaching are methods which involve placing students as far as possible in the position of discoverers,—methods which involve their finding out instead of being merely told about things." This statement speaks very clearly that telling is in no way teaching. The Heuristic method tends to set the learner himself on the track of invention and to direct him into the paths in which the author has made his own discoveries. Heuristic Method is learning by doing.

Leading heuristic learning call to the first principle, which explains principles and solutions, and last principle that does not use principles and solutions. It means that teacher explains principles, however, teacher does not explain about solutions [7].

Broner proposed heuristic learning. He said that teacher should not directly teach to transfer knowledge and learning to learners. Of course, teacher should control class by self-study of learners. It means that, teacher should encourage, motivate students to test and error, and discover knowledge throughout scientific information. Broner defend from his propose by expressing that we pay attention to education as issue in order to motivate students for more thinking.

**Advantages of heuristic research:**

1. Heuristic learning improve ability of mind in students
2. Heuristic learning improve internal motivation, because, this method encourage student to seek learning activity
3. Heuristic learning, learn discovery method and encourage motivation and creation.
4. Heuristic learning leads durability of education and students try to learn
5. In this method, learning is simpler since we used objects and images in learning.
6. In this method, practically pupils learn by doing everything. The pupil should behave like a researcher and he endeavours to find answers to questions put by his teacher.
7. The teacher is there as a friend and guide as the pupil should assume the role of an investigator.
8. The method initiates activity. Also it involves activity of mind. The pupil becomes an active discoverer of truth when they are forced to such situations by the teacher. The more active and attentive an individual, the more fully and firmly does he grasp knowledge. For example, Archimedes discovered the principle when he was forced with an actual situation.
9. In this method students act as detectives. The aim of this method is to make students original discoverers.
10. In being considered as discoverers, pupils take delight and they study the subject with much sincerity and pleasure.
11. This method turns out inquisitive and enquiring pupils.
12. This method trains the students to learn things in a manner that whatever is done, is done exactly.
13. Through this method of teaching habits of observing exactly or correctly are acquired. Neatness and care in all work is insisted on. The waste of materials is discouraged and the practice of economy inculcated. The habit of patiently attending to details of problems is acquired.
14. The powers of reasoning and well thought out judgment are cultivated.
15. The most important aspect of this method is that it is formative rather than informational. Like other methods teacher does not get satisfied only passing on certain information, rather the helps the pupils to learn more and more by active participation with a searching eye.

**Disadvantage:**

1. It decreases perception and concepts
2. This method is time consuming
3. Followers of this method highly pay attention to it; however, some methods of myth cannot percept throughout feelings.
4. Heuristic method is good, however, fundamental conclusion cannot achieve throughout heuristic.
5. If each image provides shape and it can attract attention to the shape instead of to fact.
6. This method is ideal one; but fails for want of good laboratory and equipment, due to insufficient staff and big and crowded classes in our present day schools.
7. Heuristic method of teaching is an expensive system, but our schools go without minimum requirement of accommodation and equipment.
8. Amount of work done under this system is very small. Through this method of teaching, courses of study cannot be completed in the scheduled time.
9. It is doubtful whether this method is honest in so far as it’s programmed of pupils’ discovery of facts in concerned. But science demands intellectual honesty.
10. In order to acquaint pupils with all the facts in any subject through this method takes such more time than is taken in other methods. The Heurists believe in the saying, "Attempt little, but let that little be as near-perfection as possible." It is exactly in the lines of the English proverb, “Take care of the pence and the pounds will take care of themselves.” Whatever may be the ideals, the progress is bound to be slow as per the portions to be covered in proportion to time.

The purpose of the research:
Investigate effect of teaching method based on research and discovery on success of students in comparison with current teaching method in elementary school student between 2012 and 2013.

Specific objectives:
- Investigate effect of cognitive method teaching and research on academic improvement in science
- Investigate effect of cognitive method teaching and research on student perception in science
- Investigate effect of cognitive method teaching and research on efficiency of teachers

Literature review:
The education of liberal arts undertake the important task of improving the quality of the whole nation and have the function of enlightening the truth, goodness and beauty, so should be paid much attention. The courses of liberal arts are taught mainly by verbal expression, so it is necessary for the teachers to have the level of higher capability of verbal expression. How to make teaching more interesting and attractive for the students is a relatively difficult problem. Meanwhile the liberal arts education has great deficiency in promoting the capability of students. Heuristic teaching can effectively activate the circumstance of class, arousing the enthusiasm of students for study by activating the thinking of students. Because of the characteristic of liberal arts courses, the heuristic teaching has many features difference from the natural science courses

Hypotheses:
- **H1**: Significant relationship exists between cognitive learning (knowledge) and scores of persons who use exploring method teaching
- **H2**: Significant relationship exists between cognitive learning (concept and perception) and scores of persons who use exploring method teaching
- **H3**: Significant relationship exists between cognitive learning (application) and scores of persons who use exploring method teaching
- **H4**: Significant relationship exists between cognitive learning and scores of persons who use exploring method teaching

Variables:
Dependent variable: Elementary sixth grade students in science class Independent variable: Heuristic methods

Techniques of heuristic teaching:
1. The teacher asked the students to check out. Teacher should be ensure that students understand question and know which they seek and how do that and how to select a good way
2. Teacher motivate student by asking and debate as well as teacher asks them to express their ideas by examples.
3. Teacher should plan activities in order to create new patterns
4. Teacher must use different educative method of teaching
5. Teacher must use issues, which can be evaluated, and measures of student’s ability.
6. Teacher must avoid from rapid conclusion based on one or two samples. Heuristic of issue in class should be mentally and show a realistic heurist with real environment.

7. Students should be aware about their progress.

**Tools and Methods:**

Due to aim of this research is comparing efficacy method of heuristic teaching on learning, concepts, and perception in elementary school; method of research is descriptive and experimental. Because, independent variable is heuristic research and dependent variable is scores of sixth grade elementary school. In current research, we divided group to two groups of controlling and test. The sample data includes 300 females’ elementary student school of Torbat Heydarieh and all of data collected randomly. Furthermore, we analyzed scores of students and after cognitive method, classifying, descriptive and then we use SPSS software and t student test.

**Test of Hypotheses:**

**H1:** Significant relationship exists between cognitive learning (knowledge) and scores of persons who use exploring method teaching To examine this hypothesis, we examined the 1,2,3,5,6,8,9,13,14,15,16,18,19 questions.

**Table 1:** Test Mean of first hypothesis

<table>
<thead>
<tr>
<th>Method of Heuristic teaching</th>
<th>Mean</th>
<th>SD</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional of teaching method</td>
<td>11.4722</td>
<td>1.44393</td>
<td>0.24065</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Method of Heuristic teaching</th>
<th>Mean</th>
<th>SD</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional of teaching method</td>
<td>9.3889</td>
<td>2.03228</td>
<td>0.33871</td>
</tr>
</tbody>
</table>

Due to calculated t is 4.36 in the table and df is 35 as well as significance level is 0.000 and it is less than 0.05, therefore, null hypothesis is rejected and first hypothesis is approved and it can be concluded that significant relationship exists between cognitive learning (knowledge) and scores of persons who use exploring method teaching.

**H2:** Significant relationship exists between cognitive learning (concept and perception) and scores of persons who use exploring method teaching

In order to test the above hypothesis, we investigated 20,11,4.

**Table 2:** Test t student of first hypothesis

<table>
<thead>
<tr>
<th>Paired Difference</th>
<th>Mean</th>
<th>SD</th>
<th>SD error</th>
<th>95% confidence</th>
<th>t</th>
<th>df</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heuristic teaching and traditional teaching</td>
<td>2.08333</td>
<td>2.86232</td>
<td>0.47705</td>
<td>1.11466</td>
<td>3.05180</td>
<td>4.367</td>
<td>35</td>
</tr>
</tbody>
</table>

In according to the table, calculated t is 7.32 and df is 35 as well as significance level is 0.000 and it is less than 0.05, therefore, null hypothesis is rejected and first hypothesis is approved and it can be concluded that Significant relationship exists between cognitive learning (concept and perception) and scores of persons who use exploring method teaching.

**H3:** Significant relationship exists between cognitive learning (application) and scores of persons who use exploring method teaching

In order to test the above hypothesis, we investigated 20,11,4, 17, and 12,10,7.
Table 5: Test Mean of third hypothesis

<table>
<thead>
<tr>
<th>Method of Heuristic teaching</th>
<th>Mean</th>
<th>Numbers</th>
<th>SD</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method of Heuristic teaching</td>
<td>3.7500</td>
<td>36</td>
<td>0.55420</td>
<td>0.09237</td>
</tr>
<tr>
<td>Traditional of teaching method</td>
<td>2.5833</td>
<td>36</td>
<td>0.90633</td>
<td>0.15105</td>
</tr>
</tbody>
</table>

Table 6: Test t student of third hypothesis

<table>
<thead>
<tr>
<th>Paired Difference</th>
<th>Mean</th>
<th>SD</th>
<th>SD error</th>
<th>95% confidence</th>
<th>t</th>
<th>df</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heuristic teaching and traditional teaching</td>
<td>1.16667</td>
<td>0.87831</td>
<td>0.14639</td>
<td>0.86949, 1.46384</td>
<td>7.970</td>
<td>35</td>
<td>0.000</td>
</tr>
</tbody>
</table>

In according to the table, calculated t is 7.97 and df is 35 as well as significance level is 0.000 and it is less than 0.05, therefore, null hypothesis is rejected and first hypothesis is approved and it can be concluded that significant relationship exists between cognitive learning (application) and scores of persons who use exploring method teaching.

**H4:** Significant relationship exists between cognitive learning and scores of persons who use exploring method teaching.

Table 7: Test Mean of fourth hypothesis

<table>
<thead>
<tr>
<th>Method of Heuristic teaching</th>
<th>Mean</th>
<th>Numbers</th>
<th>SD</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method of Heuristic teaching</td>
<td>17.8333</td>
<td>36</td>
<td>1.90488</td>
<td>0.31784</td>
</tr>
<tr>
<td>Traditional of teaching method</td>
<td>13.1667</td>
<td>36</td>
<td>3.037386</td>
<td>0.50631</td>
</tr>
</tbody>
</table>

Table 8: Table 4: Test t student of fourth hypothesis

<table>
<thead>
<tr>
<th>Paired Difference</th>
<th>Mean</th>
<th>SD</th>
<th>SD error</th>
<th>95% confidence</th>
<th>t</th>
<th>df</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heuristic teaching and traditional teaching</td>
<td>4.66667</td>
<td>3.56170</td>
<td>0.59362</td>
<td>3.46156, 5.87111</td>
<td>7.861</td>
<td>35</td>
<td>0.000</td>
</tr>
</tbody>
</table>

In according to the table, calculated t is 7.861 and df is 35 as well as significance level is 0.000 and it is less than 0.05, therefore, null hypothesis is rejected and first hypothesis is approved and it can be concluded that significant relationship exists between cognitive learning (application) and scores of persons who use exploring method teaching.

**Recommendation:**
As result of studying heuristic teaching expressed in current research and objectives; it is proposed that amount of learning increase substantially and it also motivate and progress of student’s education. Furthermore, this method of teaching should be used more at least in courses such as Science in Elementary Schools. Since, when the scientific debate is expose students to practical, it will have more persistence and it is much easier to integrate its lessons learned with other studies in comparison with a students have to learn from teacher theoretically.

**REFERENCES**